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control solenoid valves must be verified. No visible leakage from the valves into the burner(s) must be verified.

(4) *Fuel oil pressure limit control.* A safety shutdown must be initiated by lowering the fuel oil pressure below the value required for safe combustion. System shutdown and the need for manual reset prior to automatic start-up must be verified.

(5) *Fuel oil temperature limit control.* (Units designed to burn heavy fuel oil.) A safety shutdown must be initiated by lowering the fuel oil temperature below the designed temperature. System shutdown and the need for manual reset prior to automatic startup must be verified.

(6) *Combustion controls.* Smooth and stable operation of the combustion controls must be verified.

(7) *Draft limit control.* The draft loss interlock switch must be tested to ensure proper operation. The draft limit control must cause burner shutdown and prevent startup when an inadequate air volume is supplied to the burner(s).

(8) *Limit controls.* Shutdown caused by the limit controls must be verified.

(9) *Water level controls.* Water level controls must be tested by slowly lowering the water level in the boiler. Each operating water level control must be individually tested. The upper low water cutoff and the lower low water cutoff must each be tested. The audible alarm and visible indicator associated with the lower low water cutoff must be tested. The manual reset device must be tested after the lower low water cutoff has been activated.

(10) *Feed water flow controls.* The feed water flow limit device (found on steam boilers and water heaters without water level controls) must be tested by interrupting the feed water supply. Manual reset must be required prior to restarting the boiler.

(11) *Low voltage test.* The fuel supply to the burners must automatically shut off when the supply voltage is lowered.

(12) *Switches.* All switches must be tested to verify satisfactory operation.

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Subpart 61.40—Design Verification and Periodic Testing of Vital System Automation

SOURCE: CGD 81-030, 53 FR 17837, May 18, 1988, unless otherwise noted.

§ 61.40-1 General.

(a) All automatically or remotely controlled or monitored vital systems addressed by part 62 of this subchapter must be subjected to tests and inspections to evaluate the operation and reliability of controls, alarms, safety features, and interlocks. Test procedures must be submitted to the Coast Guard for approval.

(b) Persons designated by the owner of the vessel shall conduct all tests and the Design Verification and Periodic Safety tests shall be witnessed by the Coast Guard.

(c) Design Verification and Periodic Safety test procedure documents approved by the Coast Guard must be retained aboard the vessel.

§ 61.40-3 Design verification testing.

(a) Tests must verify that automated vital systems are designed, constructed, and operate in accordance with all applicable requirements of part 62 of this subchapter. The tests must be based upon the failure analysis, if required by § 62.20-3(b) of this subchapter, functional performance requirements, and the Periodic Safety tests of § 61.40-6.

(b) Tests must be performed immediately after the installation of the automated equipment or before the issuance of the initial Certificate of Inspection.

§ 61.40-6 Periodic safety tests.

(a) Periodic Safety tests must demonstrate the proper operation of the primary and alternate controls, alarms, power sources, transfer override arrangements, interlocks, and safety controls. Systems addressed must include fire detection and extinguishing, flooding safety, propulsion, maneuvering, electric power generation and distribution, and emergency internal communications.

(b) Tests must be conducted at periodic intervals specified by the Coast